

PLANNING, DESIGN, SUPPLY, ERECTION, TESTING AND COMMISSIONING OF COAL HANDLING PLANT(10MTPA CAPACITY) ON EPC PROJECT ATJVR OCP, SATHUPALLI

1.0 BASIC DATA & SYSTEM DESCRIPTION

1.1.1 BASIC DATA

- (a) Location : JVR OC SATHUPALLI, KGM AREA, SCCL, TELENGANA
- (b) Mineable reserves of coal :
- (c) Annual mine target : 10.00 MT of coal
- (d) Quality of coal : Grade – G9/G12

1.1.2 COAL HANDLING & PRE-WEIGH LOADING ARRANGEMENT

1.1.2.1 GENERAL

- (a) Handling capacity (Total) : 10 MTPA
12 MTPA (Design)
- (b) No. of working days/year : 365 days
- (c) No. of working shifts/day : 3
- (d) Effective working hr/shift : 6
- (e) Bulk density
- (i) For capacity calculation : 0.8 t/m³
- (ii) For load calculation : 1.2 t/m³.

1.1.2.2 COAL RECEIPT & CRUSHING

- (a) Type of crusher : Feeder breakers
- (b) No. of feeder breaker : 06

1.1.2.3 BELT CONVEYOR SYSTEM

- No of belt conveyor :16 Nos.
- Capacity of each conveyor :1200 TPH(C1,C2, C3, C4,C5 &C6)
2200 TPH(A1,A2 A3,B1,B2,B3, C7&C8)
- Capacity of reclaim conveyors : 3000 TPH(A4&B4)
- Width of belt conveyors up to Bunker : 1400 mm (EPFR& ST)
- Width of reclaim belt conveyors : 1600 mm (EPFR)

1.1.2.4 MAIN STORAGE

- Type of Bunker : Surface ground level Bunker with partition
- Capacity : 21,000T(8000T+5000T+8000T)
- Side slope : 55°
- Spreading equipment : Tripper Trolley conveyor
- Reclaim equipment : Plough feeder 2000TPH

From reclaim equipment : 2 streams of 1600 mm. belt conveyors.

1.1.2.5 RAPID LOADING SYSTEM-02nos.

1. Surge Bunker capacity : 600 Cu.mtrs.
2. Weigh Hopper capacity : 90 Cu.M.
3. Material to be loaded : Crushed coal of less than 200 mm size
4. Bulk density of coal : 0.8 Tonnes / Cu. Metre
: 1.2 Tonnes / Cu. Metre (for calculation)
5. Moisture content : Inherent moisture 7 to 10%.
Surface moisture upto 20%(rainy season)
6. No. of loading points : One
7. Mode of loading : Pre-Weigh batch
8. Rate of loading into Wagons:Up to 4200 TPH
9. Rake capacity / length : 3700- 4200Tonnes/660m with Electric loco
10. Rake loading speed : 0.2 to 1.2 Kmph
11. Type of Wagon to be loaded: All types of Wagons manufactured by Indian Railways
12. Ambient temperature : 50 Degree Centigrade
13. Loading schedule : 3 Shifts, 7 days a week and 365 days in a year
14. Power supply : 550V A.C., 50 Hz.
16. Loading accuracy : +/- 1% of Target weight or +/- 500 kg. per Wagon whichever is higher.
17. Weighing Accuracy : +/-0.05% per Wagon and +/-0.02% per unit rake

2.1.2.6 WEIGHTMENT.

- a) Type of weighing system : Pre-weigh hopper system of loading.
- b) Weighment : In motion rail weigh bridge
- c)Wagon Marshalling : By creep controlled loco(preferably Electric loco) @0.8-1.1 km/hr

1.1.2.7 DUST SUPPRESSION : For whole proposed CHP .

1.1.2.8 FIRE FIGHTING & PLANT CLEANING SYSTEM: For whole proposed CHP

1.1.2.9 OTHER ASSOCIATED SYSTEM : As described in the Report

1.2 DESCRIPTION OF PROPOSED SYSTEM:-

The proposed system will be consisting of the following sub-systems:-

- a. Crushing System- Feeder breaker circuits
- b. Belt conveyor system
- c. Storage
- d. magnetic separators
- e. Rapid loading system
- f. Weighment
- g. Sampling
- i. Other associated systems like power supply, illumination, control & communication, chute & dust suppression, fire fighting & plant cleaning system and other materials handling equipment.

06 Nos. of feeder breakers of 500TPH Capacity are provided to crush the coal. The ROM Coal will be transported in 60T rear dumpers and unloaded into the hoppers of feeder breakers. These 06 feeder Breakers are installed at two locations, each location consists of 03 Feeder Breakers.

Total Coal handling system of JVR CHP is proposed for two streams i.e Stream A & Stream B

Stream A- Transportation of G9 Grade coal from Quarry to G/L Bunkers.

Stream B- Transportation of G12 grade coal from Quarry to washery and washed G 9 grade Coal from washery to G/L Bunkers and in the event of any break down at Washery the G12 directly fed in to the G/L Bunkers as per the requirement.

1.2.1 Stream A:

03 nos. of 500 TPH Feeder Breakers(-) 200 MM are to be installed at surface and the G9 Grade ROM coal will be transported in 60T Rear Dumpers fed into the hoppers. Each feeder breaker is provided with a 1400mm width, 50m long, 1200TPH, belt conveyors (C1,C2 &C3).The crushed coal is transported onto 1400MM width, 760mtrs long and 2200 TPH capacity Conveyor(A1).

The A1 conveyor Gantry will cross the washery Area over the 8mtrwide at a height of 10mtrs and 150m long. A1 Conveyor will pass on to the gantry and all along the 30 mtrsheight O.B dump and discharge on to A2 Conveyor. A2 Conveyor transport the G9 Grade coal and discharge on to 1400MM wide tripper trolley conveyor(A3) for uniform discharge into G/L Bunkers. A2 Conveyor will be lowered from 30mtrs height OB Dump to surface and again raised to 15 mtrsheight to discharge on to Tripper Trolley Conveyor(A3).

1.2.2 Stream B

03 nos. of 500 TPH Feeder Breakers(-) 200 MM are installed at surface and the G12 Grade ROM coal is transported in 60T Rear Dumpers will be fed in to the hoppers. Each feeder breaker is provided with a 1400mm width, 150m long, 1000TPH, belt conveyors (C4,C5 & C6). The output of each Feeder Breaker transported through these conveyors and discharge into 100 T capacity steel bunkers and from the bunkers the coal is transported into Washery by the Trucks after weighing on 60T Lorry weigh bridge. Transportation of Coal by Trucks is not under this scope.

After washing and other arrangements the G12 grade Coal converted to G9 grade. The washed G9 grade coal, after weighment on 60T Lorry weighbridge, unloaded in to 60 T Lorry unloading Bunkers. 04 nos. of truck receipt RCC/Steel hopper with suitable liner has been envisaged for this purpose. The truck receipt hopper shall be located at Washery Area. Coal shall be reclaimed from RCC truck receipt hopper by suitable capacity Reciprocating feeders to feed the underneath conveyor C8. This coal shall be discharged on to conveyor A2 or B2 as per the requirement and for onward transportation. The B2 Conveyor shall be installed in parallel to A2 Conveyor and on similar conditions. The G9 washed Coal discharged from B2 Conveyor on to 1400 MM wide tripper trolley conveyor(B3) and unloaded into G/L Bunker.

In the event of break down at washery alternative arrangements shall be made to transport G12 grade coal directly to G.L Bunkers. For this purpose B1 conveyor of 1400 MM width shall be erected in parallel to A1 conveyor. Both A1 and B1 conveyors shall run on a common gantry of 8 meters wide at a height of 10 meters at a length of 150 meters at washery Area to facilitate the movement of Trucks. One more 1600 MM width conveyor(C7) to be erected under C4,C5&C6 conveyors and discharge on to either A1 or B1 conveyors as per the need and to be transport G12 grade Coal to G/L Bunkers.

The discharge drums of A1 & B1 & C8 Conveyors and tail end Drums of A2 & B2 Conveyors shall be installed on 30 meter over burden dump. Keeping in view of

loose soil special care/design shall be taken care of.

The Conveyors A1,A2, B1 and B2 shall be covered with detachable arrangements to avoid coal dust exposure.

1.2.3 STORAGE & RECLAIM

A semi Ground Level bunker(Elevated) of 21,000 T Capacity has been envisaged in the proposed system. Stacking of coal in the bunker will be by travelling tripper on conveyors A3& B3. The proposed bunker shall be designed for self flowing of Coal with a partition to store 8000T, 5000T and 8000T of Coal separately. There shall be 2 nos. slit type openings beneath the Semi Ground level bunker. Two nos. of plough feeders are to be installed for each slit, one is for working and the other is stand-by. Maintenance bay shall be provided on both sides of the semi ground bunker to carry out repair/maintenance of Plough Feeders. The proposed bay will have suitable capacity Electrical hoisting arrangement. The rated capacity of the plough feeders will be not less than 2000 TPH each.

Below eachslit one no. reclaim cum loading conveyorof 1600MM wide, 3.5 M/sec speed, 3000TPH are to be installed. These conveyors (A4& B4) will carry the coal discharged from plough feeders and finally load into the Pre-weigh wagon loading systems of 600/90 cu.mtrs (4200TPH) capacity each.

The conveyor arrangement shall be such that both the conveyors (A4&B4) can able to discharge the coal into one Pre-Weigh wagon loading system or into individual Wagon loading system at a time as per the requirement.

1.2.4 RAPID LOADING SYSTEM

Suitable capacity Conveyor feeds – 200mm size coal into the 600 Cu.Mtrs. capacity Surge Bunker. The system shall be designed to load the Wagon of capacity up to 72 Tonnes. The system shall have the capacity to load number of Wagons continuously, provided the in feed conveyor fills sufficient quantity of coal in the Surge Hopper.

Surge bunker shall be designed for a capacity of 600 Cu.mtr. (about 480 Tonnes of crushed ROM Coal). The Surge bunker shall have two outlets with one no. discharge gate of suitable size for each outlet to discharge Coal into the Pre-Weigh Hopper. The discharge gates of the Surge Hopper shall discharge a column of coal into the 72 Tonne capacity Weigh Hopper as per the pre-determined / programmed quantity.

A Pre-Weigh Hopper of 72 Tonnes capacity, located directly below the discharge gates of the Surge Hopper, shall be provided for discharging the pre-weighed quantity of Coal into the Wagon placed below it. The Weigh Hopper shall be designed to rest on 4 (four) Load Cells to facilitate accurate measurement of quantity of Coal to be loaded into the Wagons. The Weigh Hopper shall be provided with one

Cut-off discharge gate with a suitable swing / telescopic chute assembly for discharging Coal into the Wagons.

The Swing / telescopic chute assembly shall be designed and to be positioned conveniently for loading Coal into different types of Wagons.

The loading system shall be designed to operate by a suitable high speed hydraulic system electronically by PLC, various sensors etc. for accurate loading of different Wagons. A hydraulic power pack assembly with standby arrangement shall be provided to operate all the related gates and the chute to have smooth, speedy and consistent operation.

A microprocessor based PLC system shall be provided to control the weighing & loading and to generate the reports.

1.2.5 WEIGHMENT

In addition to the above one numbers of 140T pit-less In-Motion Wagon Weigh bridges shall be installed on main tracks for weighment of Rakes.

1.2.6 COAL SAMPLING

Fully automatic Coal sampling system to be installed in the CHP. Coal from conveyor A4&B4 will be collected by the sampler at pre-determined intervals by cutter type samplers to assess the quality of the coal being dispatched. The coal samplers will be installed on the conveyors A4&B4 at suitable location.

1.2.7 OTHER ASSOCIATED SYSTEMS

A.DUST SUPPRESSION SYSTEM

The objective of this system is to control air pollution effectively. Adequate number of nozzles will be installed at transfer points for suppression of dust by spraying water in atomized condition. The dust suppression system shall be inter-locked with the conveyor system so that it will be in operation only when conveyors are running with coal on the belt. The dust suppression system shall be at Transfer points Truck/Dump receipt hoppers, Semi ground bunker, Truck Loading points and on Conveyors.

B. NOISE CONTROL MEASURES

All transfer points and hoppers shall have wear resistant rubber/synthetic liners of suitable specifications to reduce the noise and wear.

C. FIRE FIGHTING SYSTEM

Install fire hydrant systems all along the Conveyors, Crushers and including Coal stock yards at suitable spacing with suitable high pressure water supply pipelines, hoses, hose boxes as per the standard practice. Suitable fire extinguishers will be provided to deal with electrical/oil/ordinary fires at all the required points in the plant like control room, sub-station buildings, office premises, drive houses etc.

D. PLANT CLEANING SYSTEM

Fire fighting system provided shall also be used for plant cleaning purpose also.

E. TRAMP METAL REMOVAL

Inline magnetic separators to be installed on conveyors A1 and B1 to dispatch clean coal without any ferrous metals.

F. PREVENTIVE MAINTENANCE

For effective maintenance of all the equipment there will be sufficient working space for each equipment/machinery. All the equipment, transfer points etc. shall be covered and will have housing complete with handrail, ladder, cross over ladder etc. as required. Electrical hoist shall be provided at Maintenance bays of Plough Feeders and at A4/B4 discharge points.

G. WORKSHOP FACILITY /OFFICE BUILDING/STORE ROOM/CYCLE SHED / CANTEEN AND TOILETS

The above facilities shall be provided

1.3 ELECTRICAL SYSTEM DESCRIPTION

1.3.1 POWER SUPPLY ARRANGEMENT:

The source of power for the project is from 132 KV sub-station(TS NPDCL) of Penuballi village at a distance of 9.00 Km. The total Power requirement for this OC project is 10000 KVA. The estimated maximum demand and energy consumption at peak production on considering power factor improvement by capacitors and diversity factor.

Connected load –

System power factor ≥ 0.98

Two numbers of 5 MVA 33/3.3KV Power transformers are to be installed at 33 KV/ 3.3KV Substation to meet the loads of the proposed Crushers, Conveyors and the RLS system at Pre-Weigh Wagon loading system. The secondary neutral of the transformers shall be earthed through neutral grounding resistor of suitable capacity with earth continuity monitoring Relay.

All the equipment's, conveyors and the RLS system at Pre-Weigh Wagon loading system will operate at 3.3 KV/550 V, 3 phases, 50 Hz supply system. Four numbers of 3.3KV/550V substations are to be installed for feeding the loads of CHP & Pre-Weigh Wagon loading systems

1.3.233 KV Out Door Substation

33 KV power will be tapped from the existing 33 KV substation by laying 500 mtrs length of 33 KV OHT line to cater the loads and 33KV/3.3KV substation to be established near the CHP. The 33KV line shall be erected on 14 meters height towers to facilitate movement of Trucks/Dumpers.

For feeding power to 3.3 KV substation 1 & 2, two sets of double circuits of 3.3 KV overhead lines with ACSR, WOLF conductors will be drawn. These lines will be drawn from 33/ 3.3 KV substation up to the proposed 3.3KV substation-I and terminated on a DP/4P structure. The second lines will be drawn from 33/3.3 KV substation up to the proposed 3.3 KV substation-II and terminated on a DP/4P structure.

For Feeding power to Conveyors(A1,A2,A4,B1,B2,B4 and C8) two sets of single circuit 3.3 KV overhead lines with ACSR, WOLF conductors are to be laid along the conveyors up to G/L bunkers. The same overhead lines will be extended up to the proposed 3.3 KV substation-4 and terminated on a DP/4P structures. Tapping to be taken from the same overhead line to feed power to 3.3 KV Substation no.3

The Over Headlines shall have pin type/disc type insulators, necessary cradle guards for road crossing, stay rods, double poles as per requirement, earthing, sag & clearances and other accessories conforming to relevant IS, IEE Rules.

1.3.2.0 POWER DISTRIBUTION ARRANGEMENT: Considering the load centre of the proposed CHP, length of conveyors and the power requirements for different drives, rapid loading and control system, it is proposed to construct four numbers 3.3 KV Substations i.e Substation-1,2,3 & 4 at the CHP. These substations will receive power by tapping 3.3 KV overhead lines drawn from 33/3.3 KV substation. Substation-1 shall be located near the proposed G9 grade Feeder Breakers, the Substation-2 shall be located near G12 grade Feeder Breakers, the Substation-III shall be located near Lorry unloading Bunkers and substation-4 will be located near the Pre Weigh wagon loading. A tentative power supply arrangement is shown in the

drawing which is enclosed in this document. However, the details have to be worked out by the Bidder.

1.3.2.13.3 KV SUBSTATION - I

The 3.3 KV substation-I will be installed near the G9 Grade Feeder Breakers for supplying power to the drives of C1, C2, & C3 belt conveyors, 03 nos of 500 TPH Feeder Breakers, Electromagnetic/Hydraulic brakes, Electromagnetic Separators, Motorized flap gate, other misc. loads and lighting loads. The following will be provided at this substation:

A. POWER TRANSFORMER

Three numbers of 3.3 KV /550V transformer (indoor type) of suitable capacity will be provided along with required electrical in this substation to meet the requirements of G9 Grade Feeder Breakers and corresponding Conveyors.

B. LIGHTING TRANSFORMER & MAIN DISTRIBUTION BOARD –1 (LMDB-1)

This lighting distribution board will be of 230V, 3ph type of required capacity. The board will receive power from the secondary of the 50 KVA, 3.3kV/230V (L-L) lighting transformer installed in this substation.

1.3.2.2 3.3 KV SUBSTATION - 2

The 3.3 kV substation-II will be installed near the G12 Grade Feeder Breakers for supplying power to the drives of C4, C5 & C6 belt conveyors, 03 nos. of 500 TPH Feeder Breakers and 03 nos. of Bunker door open/close Hydraulic power pack, Electromagnetic/hydraulic brakes, other misc. loads and lighting loads

A. POWER TRANSFORMER

Three numbers of 3.3 KV/550V transformer (indoor type) of suitable capacity will be provided in this substation to meet the requirements of power to G12 grade Feeder Breakers and corresponding Conveyors.

B. LIGHTING TRANSFORMER & MAIN DISTRIBUTION BOARD –2 (LMDB-2)

This lighting distribution board will be of 230V, 3 ph type of required capacity. The board will receive power from the secondary of the 50 KVA, 3.3KV/230V (L-L) lighting transformer installed in this substation to provide lighting surroundings of G12 grade Feeder breakers.

1.3.2.33.3 KV SUBSTATION – 3

The 3.3 KV substation-3 will be installed near the 60T Lorry unloading Bunkers for supplying power to 04 nos. of 600 TPH Reciprocating Feeders, Electromagnetic /Hydraulic brakes, Motorized flap gate, other misc. loads and lighting loads. The following will be provided at this substation

A.POWER TRANSFORMER

One number of 3.3 KV /550V transformer (indoor type) of suitable capacity will be provided along with required Electricals in this substation to meet the requirements of 04 nos. of 600 TPH Reciprocating Feeders and other misc. loads.

B. LIGHTING TRANSFORMER &MAIN DISTRIBUTION BOARD –3 (LMDB-3)

This lighting distribution board will be of 230V, 3ph type of required capacity. The board will receive power from the secondary of the 50 KVA, 3.3kV/230V (L-L) lighting transformer installed in this substation to provide lighting surroundings of Lorry unloading Bunkers and all along the Conveyors -A1,B1, A2 & B2.

1.3.2.43.3 KV SUBSTATION –4

The 3.3 kV substation -4 will be installed near Pre Weigh wagon loading supplying power to the drives of belt conveyors A3/B3, 2 nos. of motorized hoists at G/L Bunkers & A4/B4 discharge drums, Electromagnetic/Hydraulic brakes, Wagon loading system and other loads i.e Dust suppression, Dust extraction and Fire fighting Systems and lighting loads.

A.POWER TRANSFORMER

One number 3.3 KV /550V transformer (indoor type) of suitable capacity will be provided in this substation to meet the requirements of power to conveyors A3/B3, Wagon loading system and other misc. loads.

B. LIGHTING TRANSFORMER & MAIN DISTRIBUTION BOARD –4 (LMDB-4)

This lighting distribution board will be of 230V, 3 ph type of required capacity. The board will receive power from the secondary of the 50 KVA, 3.3KV/230V (L-L) lighting transformer installed in this substation to illuminate around G/L Bunker, Wagon loading system and all along gantries of Tipper trolley and Reclaiming conveyors.

1.3.3 The capacity of all the transformer shall be selected based on the following:

- i) The transformer shall be loaded 50%-60% of rated capacity
- ii) The transformer shall be of preferred capacity as per Indian standards.

- iii) It shall meet the requirements of loads connected to it.
- iv) The capacity shall commensurate with the starting requirement of the biggest motor along with the other loads in operation.

1.3.3 CONTROL SYSTEM

The control scheme of the CHP and rapid loading system along with sequencing shall be done through microprocessor based programmable logic controller (PLC) suitable for industrial control system.

1.3.4 UTILISATION VOLTAGE

Supply voltage of 3.3KV shall be provided for all the motors of 110KW & above and Equipment below 110 KW shall get power at 550V. However Feeder Breakers, Plough Feeders and Reciprocating Feeders may have 550V drives.

1.3.5 POWER FACTOR

The power factor of the plant has to be improved to a level above 0.98 lagging at the 3300 volts switch board of substations. For this purpose 2 sets of capacitor banks with manual control panel will be provided at 33KV substation considering the load of the CHP & Pre-Weigh System

1.3.6 ILLUMINATION

1.3.6.1 The plant area indoor as well as outdoor shall be properly illuminated for ease in operation, safety and security. The minimum illumination level and type of luminaries required at various major locations shall be as given below:

Sl.no	Location	Level of Illumination	Type of lighting fixtures
01	Substations/switching stations , Maintenance cum testing room, stores/ tools room, engineer's room compressor room, Pump house etc.	200 H	Single /Double, Fluorescent tube lights (36/40W) with industrial type lighting fixtures with energy efficient choke
02	Control Room	300 H	Single/Double, fluorescent tube lights (36/40 W) or four fluorescent tube lights (18/20 W) with Decorative lighting fixture with energy efficient choke
04	Conveyor Gentries, tunnel, Ground Bunker, Loop take-up house, floor of tripper and reclaim conveyor in O/H	70 H	Metal Halide/ HPSV lamps (70 watts) with well glass lighting fixtures

	bunkers		
05	Transfer houses, drive houses, Hopper complex, Floor of hoppers, various platforms in silo and Sampler house, Wagon loading area.	50 H	Metal Halide/ HPSV lamps (70/150/ 250W) with flood light fitting
06	Substation outdoor yard, roads inside area and along the conveyers	20 H	Metal Halide/ HPSV lamp (150 /250 /400W) with street Light/Flood light fitting
07	Lighting near truck/Dumper receiving stations, outside bunker and SILO complex and Feeder Breakers Area	40 H	Lighting through 15 m/30m high lighting mast Metal Halide/ HPSV (400 W) flood light fittings.

The Bidder shall calculate the number of luminaries required to achieve the above illumination levels after considering the maintenance factor of 0.6, co-efficient of utilisation factor depending on the area to be illuminated, internal/external areas etc. The internal area of conveyor gantry, drive houses, Pre-weigh bin floors, substation, control room, pump house, compressor room, Engineer's room, testing room, stores etc shall be determined by the bidder depending on the system requirements.

The actual external area to be illuminated shall be worked out by the bidder during detail design and accordingly luminaries shall be provided.

Each Lighting transformer will be provided with a timer & contactor for automatic control of switching.

1.3.7 CABLES

A.Lighting & Control Cables

All the lighting Cables shall be of 3 core, 1.1KV grade, PVC SWA,Copper cable of suitable capacity. The size of the cables shall be selected giving due consideration to continuous rating, de-rating factor, voltage drop limit and short circuit with stand capacity. However the minimum size of the cable from main to sub-distribution board shall not be less than 16sq. mm and sub-distribution board to individual circuits shall not be less than 10sq. mm.

B. Power Cables

All the cables used for connecting the transformers with 3.3 kV vacuum circuit breakers, 3.3 kV VCP with HT motors, cables from isolators to circuit breakers will be of 3.3 kV grade as per requirement. All other cables will be of 1100V grade. The HT cable shall be PVC double layer armoured with copper conductor, suitable sheathed, having FRLS properties in outer sheathing and the LT cable shall be with

single wire armouring, PVC insulated and PVC sheathed copper conductors of stranded wires with FRLS properties in outer sheathing.

The size of the cables shall be selected giving due consideration to continuous rating, derating factor, voltage drop limit, short circuit withstand capacity etc. In the conveyor gantries power cables will be installed in the walkway side on cable hangers/cable trays. In the other houses these cables shall be provided on separate hangers/trays fitted to the walls or structural members. In the substation these will be laid on cable hangers provided in the cable trenches/ cable vaults. In the other places these will be laid in cable trenches as per standard practice. Route indicators will be provided for identification of the route. Hume pipes are to be provided in case of road crossing. Power cable of different voltage grades, control cable & signaling cable shall run separately in the cable tray.

Cable Trenches/Trays are to be provided complying with the relevant IE Rules & Code of Practices amended up to date.

1.3.8 EMERGENCY LIGHTING

Emergency lights will be provided in control rooms and substation buildings suitable for operation through invertors. For feeding power to these emergency lights an automatic battery charger-cum-inverter device along with suitable AH capacity battery to run for at least 3 hours will be provided. These lights will be starts automatically in case of any power failure. The emergency lights shall be suitable type to meet the site conditions. For this separate wiring will be done along with the provision of separate luminaries.

1.3.9 EARTHING & LIGHTNING PROTECTION

Proper earthing arrangement for the plant has to be provided as per I.E Rules. Additional earthing grid shall have to be developed around the periphery of 33 KV substation and 3.3 KV substation/ switch station. The earth grid shall be formed by interconnecting GI strip of size not less than 65 mm x 5 mm.

Each motor, transformer, switch panel and other electrical equipment should be earthed by two separate earthing strips. In addition all the motors will be earthed through the armouring of the connecting cable. All the poles of the Lightning Arrestors, body and neutral of the transformers shall be earthed separately. Size of earthing strip and electrodes shall be as requirement, as per relevant IS, to be finalized by the bidder during detailed engineering stage. However, the size of main earth bus strip shall not be less than 65 mm x 5 mm where as that of the connecting earthing strip shall not be less than 25 mm x 5 mm.

Adequate care shall be taken towards earthing of light fittings, welding sockets etc. G.I. strips will run along the conveyor for earthing of light fittings, junction boxes, control switches (pull chord switches, belt sway switches etc.)

As JVR OC CHP is a lightning prone area, proper lightning protection shall be provided as per IS 2309 (latest amendment).

In order to protect the substation building, drive stations of belt conveyors OH bunker and silo buildings. etc. from direct lightning strokes a proper lightning protection system as per relevant Indian standards shall be provided. For this purpose required numbers of spikes/interceptors of at least 2m height will be provided on the roof tops of the above buildings and drive houses. The spikes/interceptors provided on each building and will be interconnected by means of suitable size G.I. flats supported on saddles to form a grid.

Separate earth pits will be provided around the buildings and interconnected by means of suitable Galvanized steel flats. The above flats will be laid in the ground at a depth of 700 mm. The earth pits will be constructed as per Indian Standards.

The value of earth resistance shall not exceed one ohm in all the time throughout the year. Earth pits/ Earth electrodes shall be located near 33 kV substation and 3.3 kV substation, Ground bunker, Silos, transfer houses, hopper house, intermittent points along conveyor gantries etc.

1.3.10 WELDING SOCKETS

550V, 3 Ph 4 pins industrial type dust proof plug interlocked power plug & socket with switch shall be provided. Welding receptacles shall be connected with each other in loop-in loop-out connection (to the extent of 5 nos. max.) located at an interval of 50 m along the conveyor and both side of ground bunker and minimum one no shall be provided in all equipment, floor of Transfer Points, drive houses, floor of hoppers, silo floors, substation/switch stations etc. The sockets receive power from 3.3KV substations through PVC SWA cables of 1100 V grade, 3 core Copper conductors of suitable size.

1.4 CENTRALIZED MONITORING AND AUTO REMOTE AND AUTO SEQUENCE CONTROL

1.4.1 PRINCIPLES OF CONTROL

The auto control of CHP operations i.e. auto remote, auto sequence of interlock, de-interlock, local/manual, local/central, signaling, data logging, data display, etc. to be achieved by dual redundant PLC .

A back up UPS system of minimum 60 minutes capacity will be provided to operate the equipment in control desk in case of power failure for keeping the memory of computer system alive. Battery system shall be rechargeable type & maintenance free.

The equipment in coal flow line in each section shall be started automatically in sequence in the reverse of coal flow. Similarly, the stopping shall also be in sequence and in the same direction as of coal flow. However, the sequence of starting and stopping of Drive system shall be predetermined time lag.

The concept of control of CHP through PLC is briefly given below to facilitate preparation of suitable control system by the tenderer. The bidder has to supply comprehensive scheme incorporating all the features with latest technology.

The control scheme of the entire plant shall be done through microprocessor based programmable logic controller (PLC) suitable for industrial control system. The PLC shall provide the facilities for interlocking, sequence control, process control, data logging, data display and printing, supervisory control etc. All the PLCs should be provided with UPS.

The control room shall be provided with control desk for individual stream with continuous laminated colour graphic dynamic mimic, VDU screen and annunciation panel with all facilities. PCs for operation and Engineering shall be provided and located in the control room.

The centralized control system shall have the following provisions:

Provision of selecting auto de-interlock/local mode shall be made. Remote control operation may be through PLC or through control desk. Through PLC all equipment shall have auto-sequence start whereas through control desk all equipment shall have manual sequence start. Provision for diagnostic packs for self-fault detection of PLC system shall be provided.

The mimic of the storage & reclamation section at the control room shall show the status of PWWL and mimic of wagon loading at PWB control Room. At control room shall also show the status of Plough feeders, reclaim conveyors and quantity of coal in the Surge hopper.

Provision of display through continuously luminous mimic panel to indicate status of operation of different equipment shall be provided.

Start of all the connected equipment from the respective control desk in sequence in case of failure of auto sequence control.

1.4.2 CONTROL AND MONITORING OF EQUIPMENT

The conveyors and equipment should be able to trip on occurrence of the following conditions:

1. Under speed (for conveyors only)

2. Belt sway operated with the arrangement to bypass belt sway switches at the time of the starting of the plant and also during normal running if found necessary (for conveyors only)
3. Pull chord switch operated (for conveyors only)
4. Single phasing of the power supply
5. Motor winding and bearing overheating (HT motors only)
6. Operation of safety and protection device
7. Motor overload
8. Any other fault if found necessary during detailed engineering stage by the Customer

1.4.3 FAULT ANNUNCIATION SYSTEM

Provision shall be made for audio-visual fault annunciation system for following.

- i). Pull chord switch operation
- ii). Belt sway switching operation
- iii). Winding/bearing temperature high for HT motors
- iv). Emergency stop operation
- iv). Any other item as found necessary during detailed engineering stage by the customer/consultant.

1.4.4 SIGNALLING AND ALARM

Prior to starting of the plant, a provision of inspection shall be there to take care of the stage of readiness of the entire plant. All the focal points shall be provided with audio-visual signaling arrangement for communicating the permission to start.

Pre-start hooters shall be provided at strategic locations i.e near drive units, tail end and discharge end etc.

1.4.5 COMMUNICATION

The following communication system shall be installed in the coal handling plant.

A. Public address system

Two way communication circuits shall be incorporated to ensure rapid communication between control room operator and attendant of the different equipment and any other person working in the plant. Provision to start the plant from remote, only when the start permissive signal is received from operators located at strategic location in the plant through the operation of push buttons (TWC).

B. PROJECT ADMINISTRATIVE COMMUNICATION SYSTEM

Required nos. of automatic dial type telephone sets shall be provided at various locations in the Coal Handling Plant as stated below:

- i). Dumper receiving hopper Complex - 6 Nos.
- ii). Office - 4 nos.
- iii). Bunker - 2 nos.
- iv). Substation (one each at 33kV, 3.3KV S/S 1,2,3 &4) - 5nos.
- v). Central control room - 1 no.
- vi). Pre-Weigh bin control room - 2 Nos.

These telephone sets shall be wired and brought to a common junction box in the plant. Then this will be connected to the auto exchange to make it an integrated communication system.

1.4.6 AIR CONDITIONING

Split type air conditioners of suitable capacities should be provided at Central and Pre-weigh bin Control room. PLC rooms. Engineer-in-charge's room shall also be provided with Split type air conditioners of adequate capacity.

Design and construction of all the substations/rooms etc. shall be done so as to prevent entry of dust and at the same time maintaining the proper temperature inside for proper working of the equipment and the personnel. Sufficient numbers of ceiling fan and exhaust fan shall be provided wherever required.

1.5 APPROVED VENDORS

Plant and Equipment supplied within the country shall be from approved vendors as listed in Approved Vendor List. at Appendix-B.

In case the bidder intends to supply P&M from vendors not listed in approved vendor list, written approval of the customer / SCCL shall be taken who, after evaluating of eligibility and qualification of such vendors, may choose to include them in approved vendor list. Bidder shall furnish information for evaluation and qualification of each such vendor. For plant and equipment supplied from vendors abroad, information for evaluation and qualification of each vendor shall be furnished and the written approval of employer for approved foreign vendors shall be taken.

1.6 Selection of equipment, accessories and materials

- a. shall be according to design referred above and approved by the Customer.
- b. Preparation and execution of maintenance schedule during and after the guarantee period as per approval of the Customer.
- c. illumination system of entire CHP including Rapid loading Complex, adjacent areas and gantry of conveyors, substations etc.
- d. Lightning Protection System for structures having height of 10 m and above.
- e. Earthing system of all the electrical equipment covering electrical system for entire CHP including rapid loading complex, electrical equipment of conveyors, substations etc.
- f. Battery and Charger, if required.

- g. Power, Lighting and Control Cabling.
- h. Control Desk cum mimic panel and annunciation Panel for control of equipment of Rapid Loading Complex, Loading Conveyors and other miscellaneous Electrical drives.
- i. Control, automation, interlocks, Signaling and instrumentation of Rapid Loading complex including sequence operation of loading conveyors with PWWL level indicator and dove-tailing of sequence operation of Reclaim Conveyors with plough feeders below ground bunker.
- j. The rating of equipment indicated in the drawings are minimum and bidders are required to assess the rating of equipment as per system requirement and quote accordingly.
- j. Provision of inverter base emergency lighting in substations and control rooms in case of failure of power.
- k. Transformer capacity mentioned in the drawing is minimum capacity. Bidders shall make their own assessment and shall indicate higher capacity, if required. All the transformers including that of lighting shall be located indoor only
- l. All the electrical installations shall be as per Indian Electricity Rules and DGMS Regulations. Approval of DGMS shall be obtained by the Bidder along with submission of necessary Test certificates/drawings/circuit diagrams

1.7 TRAINING

The plant personnel responsible for operation & maintenance of the plant and deputed by employer shall be properly trained whether in land or overseas, so that the persons are fully conversant with the assembly and sub-assembly of the equipment, detail circuit of the electrical control system including, hydraulic system & operation and maintenance etc. The plant personnel shall be in a position to rectify any defects of the equipment developed during operation of the plant for efficient running with minimum down time.

1.8 ENGINEER'S SUPERVISION

To eliminate delays and avoid disputes and litigation it is agreed between the parties to the contract that all matters and questions shall be referred to the engineer and his decision shall be final. The work shall be performed under the direction and supervision of the engineer.

The scope of the duties of the engineer, pursuant to the contract, will include but not be limited to the following :

- a. interpretation of all the terms and conditions of these documents and specification.
- b. review and interpretation of all the Bidder's drawings, engineering data etc.
- c. witness or authorise his representative to witness tests and trials either at the manufacturer's works or at site, or at any place where work is performed under the contract.
- d. inspect, accept or reject any equipment, material and work under the contract.

- e. issue certificate of acceptance and/or progressive payment and final payment certificates.
- f. review and suggest modifications and improvements in completion schedules from time to time.
- g. supervise the quality assurance programme implementation at all stages of the works.
- h. to receive and endorse the despatch documents enabling the Bidder to clear the consignments.

1.9 TEST RUN

1.9.1 Start up

- a) On completion of erection of the equipment and before start-up, each item of the equipment shall be thoroughly cleaned and then inspected jointly by the Engineer and the Bidder for correctness and completeness of installation and acceptability of start-up, leading to initial pre-commissioning tests at site. The list of pre-commissioning tests to be performed shall be as mutually agreed and included in the Bidder's quality assurance programme.
- b) The Bidder's commissioning/start-up. Engineers specifically identified as far as possible shall be responsible for carrying out all the pre-commissioning tests. On completion of inspection, checking and after the pre-commissioning tests are satisfactorily over, the complete equipment shall be placed on initial operation during which period the complete equipment shall be operated integral with sub-systems and supporting equipment as a complete plant referred hereinafter as plant.

1.9.2 Trial Operation

- a) The plant shall then be on trial operation during which period all necessary adjustments shall be made while operating over the full load-range enabling the plant to be made ready for performance and guarantee tests.
- b) The duration of trial operation of the complete equipment shall be fourteen(14) days out of which at least seventy two (72) hours shall be continuous operation on full load or any other duration as may be agreed to, between the engineer and the Bidder. The trial operation shall be considered successful, provided that each item of the equipment can operate continuously at the specified operating characteristics, for the period of trial operation.
- c) For the period of trial operation, the time of operation with any load shall be counted. Minor interruptions not exceeding four (4) hours at a time, caused during the continuous operation shall not affect the total duration of trial operation. However, if in the opinion of the engineer, the interruption is long, the trial operation shall be prolonged for the period of interruption.

- d) A trial operation report comprising of observations and recordings of various parameters to be measured in respect of the above trial operation shall be prepared by the Bidder. This report, besides recording the details of the various observations during trial run, shall also include the dates of start and finish of the trial operations and shall be signed by the representatives of both the parties. The report shall have sheets, recording all the details of interruptions occurred, adjustments made and any minor repairs done during the trial operation. Based on the observations, necessary modifications/repairs to the plant shall be carried out by the Bidder to the full satisfaction of the engineer to enable the later to accord permission to carry out performance and guarantee tests on the plant. However, minor defects which do not endanger the safe operation of the equipment, shall not be considered as reasons for withholding the aforesaid permission.

1.10 Performance and guarantee test

- a) The final test as to the performance and guarantees shall be conducted at site, by the SCCL. Such tests will be commenced within a period of two(2) months after successful completion of trial operations. Any extension of time beyond the above two(2) months shall be mutually agreed upon.
- b) These tests shall be binding on both the parties of the contract to determine compliance of the equipment with the performance guarantees.
- c) The available instrumentation and control equipment will be used during such tests and the engineer will calibrate, all such measuring equipment and devices as far as practicable. However, un-measurable parameters shall be taken into account in a reasonable manner by the engineer, for the equipment of these tests. The tests will be conducted at the specified load points and as near the specified cycle condition as practicable. The engineer will apply proper corrections in calculation, to take into account conditions which do not correspond to the specified conditions.
- d) Any special equipment, tools and tackles required for the successful completion of the performance and guarantee tests shall be provided by the Bidder, free of cost.
- e) The guaranteed performance figures of the equipment shall be proved by the Bidder during these performance and guarantee tests. Should the results of these tests show any decrease from the guaranteed values, the Bidder shall modify the equipment as required to enable it to meet the guarantees. In such case, performance and guarantee tests shall be repeated within one month, from the date of equipment is ready for re-tests and all cost for modifications including labour, materials and the cost of additional testing to prove that the equipment meets the guarantees, shall be borne by the Bidder. Duration of performance guarantee tests will be of one month of which six(6) days continuous on load operation is the minimum requirement and in case it fails, the process of performance guarantee tests will be repeated.

- f) The specific tests to be conducted on equipment has been brought out in the technical specifications.
- g) Performance and guarantee test shall make allowance for instrumentation errors as may be decided by the engineer-in-charge.

1.11 TEST CODES : The provisions outlined in the ASME performance test codes or other international and Indian approved equivalents shall generally be used as a guide for all the above test procedures unless otherwise specified in the technical specifications.

1.12 Guaranteed Percentage Availability :

The tenderer shall guarantee that the system offered will be able to operate round the clock all-round and the guarantee that the system shall achieve minimum 90% availability during the initial period of 12 months from the date of issue of final acceptance test. In the event of system not being able to reach availability of 90% the penalty equivalent to 1% of the contract value for fall of 2% availability will be recovered by SCCL for maximum of 10% penalty.

The formula for availability shall be as below:

Scheduled shift hrs = 24 hrs.

Available hrs= Scheduled shift hrs(SSH)–Maintenance hrs(MAH) & Breakdown hrs(BDH)

Percentage availability = $\frac{SSH - (MAH + BDH) \times 100}{SSH}$

The maximum liquidated damages levied will be 10% and the short fall in availability for more than 20% will not be acceptable in any case and SCCL will have the right to reject the equipment after levying 10% penalty and the manufacturer shall have to replace the complete / part of the equipment, as applicable, at his cost, to meet the guaranteed percentage availability.

The Bidder shall warrant that all the equipment will be new and in accordance with the contract documents and free from defective material, workmanship and shall guarantee trouble free operation of the entire system for a period of 12 calendar months from the date of acceptance test.

2.0 CIVIL CONSTRUCTION

The civil and structural works are related mainly to the following areas (but not limited to):

- a) Pre-Weigh Wagon loading systems 600/90 Cu.mtrcapacity with staircase, control room-2 nos.
- b) 21000 T surface ground level bunker with partition
- c) Dumper Receipt Hoppers 120 T capacity-06 nos.
- d) Lorry receiving Bunkers 100T Capacity-03 nos.
- e) Truck unloading Bunkers 60T Capacity -04 nos
- f) Transfer Houses
- g) Drive Houses
- h) Conveyor Gantries & Trestles
- i) CHP office along with Time office,
- j) Security post,
- k) Rest shelter,
- l) Cycle, Scooter & Car parking shed,
- m) Toilet and Canteen
- n) First aid Room
- o) Service buildings like 5 nos. of Sub stations,
- p) Central Control room,
- q) Store shed etc.
- r) Water storage tank
- s) Roads to approach all Transfer houses, drive houses, service buildings, control rooms, CHP office etc.
- t) Proper drainage for entire system
- u) Industrial and drinking water arrangement.
- v) Internal Street lighting along the approach Roads.
- w) Any other item not mentioned but required for successful completion of the Project.

2.0 SCOPE OF SUPPLY AND WORKS

2.1 GENERAL

This is a pre-engineered EPC assignment for design, supply, erection, commissioning, trial run and handing over of all the equipment and other sub-systems of the proposed coal transportation and Pre-weigh wagon loading arrangement at JVR OCP, Sathupalli, KGM Area of SCCL as elaborated in subsequent Para in this chapter.

The contract for the package will not be split. The contract will be treated as a combined contract.

The equipment and works mentioned hereinafter to be read in conjunction with preamble, system description and basic data sheet and technical specification which are indicative and not limited to the description and/or list given.

All mechanical & electrical equipment and systems and civil works are within the scope of supply and works of Bidder.

2.2 SCOPE OF WORKS AND SERVICES

2.2.1. The Scope of Work under this tender shall include design, construction, supply of equipment including transportation to site, all mechanical, electrical, civil and structural works, erection of equipment and structures, carrying out detailed survey and supply of drawing, drawing showing contours, supply of detailed design, working manuals, working drawings including all relevant calculations, testing and commissioning, elimination of all teething troubles, carrying out all performance tests and handing over of the plant as envisaged in detailed scope of work and system description. Due consideration shall be given for economy, architecture and functional utilities. This being a turn-key work, all works needed for successful completion and operation of the plant together with the associated systems shall be covered in the scope of work, whether specifically mentioned here or not.

2.2.2 All the works including designs, drawings, construction, fabrication, testing, erection, etc. shall be done strictly as per IS Code of Practices. Wherever no Indian Standard are available, British, American, German, or any other International standards may be used on prior approval from the Purchaser/SCCL.

2.2.3 The jobs to be carried out are broadly classified into three categories. These are Civil & Structural, Mechanical, and Electrical. However, the jobs are to be carried out on turnkey basis by carrying out interface works also.

The bidder shall be required to complete the following works to the complete satisfaction of customer (SCCL).

- a. Design & Engineering of all Civil and Structural, Mechanical, Electrical, Instrumentation works of the plant.
- b. One set of reproducible soft copy in Auto Cad format of all design and installation drawing (as built drawings) in six sets of prints suitably bound, shall be presented.
- c. Manual of spare parts, operation, maintenance and repair manual shall be presented in eight sets.
- d. The Bidder shall strictly follow the design as asked for in various chapters. However, any minor deviation needed to suit the requirement of the plant, betterment of the system suggested in the NIT will be done during detailed engineering stage after obtaining prior approval of the company.
- e. If any clarifications or approvals are required to be taken from statutory bodies, the same shall be the responsibility of the Bidder

- f. Conducting tests prescribed in the relevant acts, rules, regulations, codes of practices of Indian Standard and as necessitated by generally adopted sound engineering practices during erection and commissioning shall be followed.
- g. Rectification of problems detected during testing, erection and commissioning by making necessary changes in the design and / or installation and supply of equipment, accessories and material.
- h. Addition and or alteration as found necessary during tests, erection and commissioning to achieve the objective.
- i. If any other work not specifically mentioned but are required to be done to complete the plant shall be deemed to be included in the scope of work.
- j. Obtaining approvals from Weights and Measure Department/Railways is the responsibility of the bidder.
- k. The technical parameters to be furnished are subject to scrutiny/approval at the detailed design stage which may undergo minor changes keeping in view the system requirement and various codes of practices/regulation by the statutory bodies. This is also true for drawings. The parameters not specifically mentioned in the bid document shall be decided at the time of detailed engineering subject to SCCL's approval.

2.3. DETAILS OF WORKS AND SERVICES

A. DESIGN ENGINEERING

- i. Elaboration and furnishing of system design/drawing, based on actual parameters of equipment to be supplied. The system design as proposed in the plant description shall form the basis of this elaboration.
- ii. Preparation and furnishing of all relevant detailed engineering drawings based on elaborated system design drawing duly approved by consultant in writing. This includes fabrication, assembly, installation and erection drawings also.
- iii. Furnishing of detail design calculations in support of different design and equipment parameters.
- iv. Furnishing of equipment specification supported by manufacturer's illustrative pamphlets and literature.
- v. Furnishing of operational, maintenance and spare parts manual supported by the illustrative pamphlet and literature of manufacturers.
- vi. All approved drawings and documents shall be supplied in six copies in addition to one copy in AutoCAD format on CD. Final drawings/literature shall be presented in the form of document along with the soft copy.
- vii. All drawings shall comply with current Indian Standard specifications and shall be sufficiently detailed with dimensions and shall be clear and legible.
- viii. The bidder shall submit detailed time schedule in the form of PERT NETWORK for complete plant and subsequently for each major activity for monitoring purpose. The same shall be updated from time to time. This is essential in view of maintaining time schedule. The successful bidder shall have to submit monthly/quarterly progress report of the various works being carried out.

- ix. Provision of equipment (Motorised belt reeling drum) for belt erection/replacement and vulcanising during maintenance of conveyor belt shall be made available at site by the bidder.

B.ERECTION AND COMMISSIONING

- i. Erection & Commissioning of tail end frame with drum, external cleaner, skirt board, intermediate structures, take-up, drive head including motor, gear box & couplings, discharge drum, conveyor rollers, single / two way discharge chute for conveyors, safety switches and laying of suitable belting and vulcanising of conveyors .
- ii. Erection & commissioning of 500 TPH Feeder Breakers (-) 200mm, Rapid loading system, In-Motion Wagon Weigh Bridge, magnetic separator, chain pulley block, electric hoist, fire fighting system along with associated accessories and condition monitoring equipment, Erection and Commissioning of dust extraction, dust suppression and ventilation equipment at different locations wherever required.
- iii. Construction of 21000T (8000T+5000T+8000T) surface ground bunker of slit type for installation of plough feeder and tripper conveyors.
- iv. All Transfer points
- v. 600/90 cum PWWL System with pre weigh-hopper consisting of hydraulic power pack, cylinders, guillotine etype gates for high speed load out, arch breakers, load cells, wagon loading swing type/telescopic chute and temperature sensors.
- vi. Rapid loading system-The loading will be done through rapid loading system on an average one wagon per minute. The loading shall be controlled from control room located at first floor of the PWWL System. The rate of loading will be around 3600 TPH matching the creep speed of locomotive. The rakes will be hauled by a creep controlled locomotive at 0.8 to 1.2 km/hr. Ultrasonic level indicators will be provided in the Surge hopper to show the coal level position. Air blasters shall be provided to avoid /break the arch formation inside the silo and to ensure smooth coal flow through the silo. The system shall have the switches for emergency stop of feed conveyors in case of over filling of silo. There shall be temperature sensors to indicate the abnormal temperature inside the Surge hopper and provide caution so that firefighting measures can be taken up. To ensure better loading and weighing accuracy pre-weigh loading system shall be adopted. In addition 01 no. of 140T in motion rail weighbridge for wagon weighing system is required separately. Provision of two PWWL Systems are to be provided as indicated in the drawings.
- vii. Sampling system-For determining the quality of coal dispatched by each rake there shall be provision of automatic sampling of coal, cutter type, from the feed conveyors to the Surge hopper at suitable location. The sampling system shall conform to BIS/ISO/ASTM specifications and shall consist of a primary sampler fitted to each in feed conveyor and a primary sample belt conveyor of min 650mm width to collect coal samples from the two separate sample discharge chutes and to convey the primary sampled coal to the sample preparation system.

C. MISCELLANEOUS SYSTEMS

I. SAFETY DEVICES

All the equipment and conveyors in the circuit shall be provided with necessary safety devices such as emergency stop switches, overload protection, wire-netting, railing or guards, pull chords switches, belt sway switches, zero speed switches, brakes thrusters, holdback devices, etc wherever applicable. All equipment

in both the streams will be started and stopped separately from the central control room in a pre-determined sequence consecutively i.e. one by one with a definite time lag. The sequence of starting of drive will be in the reverse direction of coal flow, while topping of the drives will be in the direction of coal flow. In case of stoppage of any equipment in the circuit for any reason, all the preceding equipment/conveyors shall be stopped automatically. Pre-start hooters shall be blown to alarm the operating and maintenance personnel. All the floors and distant transfer houses shall be provided with audio-visual signals to alarm the working personnel locally. Necessary walkways and crossovers shall be provided along the conveyors. Under-netting shall be provided wherever conveyors cross any roads or working areas as elaborated elsewhere.

II. POLLUTION CONTROL

DUST SUPPRESSION AND EXTRACTION

Proper water supply arrangement for dust suppression and dust extraction will be made at dust generating points so that all working space remains free of dust. For dust suppression water jets will have to be provided in receiving pit area, silo loading point, transfer houses and dust extraction arrangements will be done at bunker location. Alternatively, fog type dust suppression can also be used at critical location. For proper ventilation in all the working floors, arrangements for installing exhaust fans/ventilation fans with ducting will have to be made as detailed elsewhere in the tender document. All civil works pertaining to dust suppression and extraction shall be as per system requirement. The pumping sets for the dust suppression/ control should have 100% stand-by. Necessary arrangements of infrastructure for reusing/recycling of used water should be made. Necessary measures shall also be taken for noise and vibration control.

III. CHUTES AND LINERS

Chutes shall be designed for a smooth flow of coal and they shall be lined with suitable replaceable polyurethane liners.. Conveyor chutes shall be carefully designed with respect to the coal trajectory to minimize impingement and wear on lining plates

IV. PLANT CLEANING AND DRAINAGE

Suitable arrangements shall be made for cleaning of plant especially at the spillage point with the help of water hydrants and vacuum cleaners in case of electrical panels and plant equipment. Plant cleaning points shall be provided at each receiving pit complex, drive house, tail end, transfer points, semi ground bunker and along all conveyors at a maximum interval of 50 metres. Proper drainage arrangement will have to be made all along the plant so that water or slush accumulation is avoided. At every probable spillage point suitable arrangement will have to be made for mechanized or manual cleaning.

V. FIRE FIGHTING OF TOTAL COAL HANDLING PLANT

Fire fighting system shall comprise of fire/heat/smoke detection, fire alarm system and fire fighting system both water and aerosol reliant. There shall be a Control unit to monitor fire fighting activities near the bunker at Substation . Fire fighting system shall be designed to meet the various requirements laid down in the fire protection manual by the Tariff Advisory Committee (TAC), India and National Fire Alarm Code by NFPA (USA).

A. HYDRANT SYSTEM:

The fire hydrant system shall be designed considering the entire plant generally as ordinary hazard as per TAC manual and shall consists of a net work of over ground piping feeding pressurised water to a number of double headed hydrant valves located throughout the entire coal handling plant.

B. PORTABLE & MOBILE EXTINGUISHERS:

Portable extinguishers of carbon dioxide type, dry powder type & soda acid/ DCP type shall be installed at suitable locations all along the plant as per TAC manual. Mobile extinguishers of required number shall be provided. Different types, as described above, shall conform to the latest BIS standards.

C. VENTILATION

Proper ventilation system shall be provided at suitable locations as per requirement.

2.4 SITE OFFICE AND REST ROOM, ETC

A site office of suitable size for Engineers/Supervisors and a rest room for workers shall be provided. Other service buildings shall be provided as detailed elsewhere and/or, as per requirement.

2.5 ELECTRICAL

Design Engineering, Erection, Commissioning, trial run, rectification of teething troubles and handing over of 33/3.3 KV and 3.3KV/550V substations. Power supply arrangement for all the electrical power driven equipment provided in the system.

Earthing and Lightning Protection System (travelling waves and direct stroke lightning) of the entire CHP, substations, SILOs etc.

For designing the earthing system the Bidder shall carry out tests at his own cost to determine the soil resistivity from a reputed firm acceptable to the company.

During construction of substation switchyards, following points are to be taken care of.

- a). Erection of 33KV and 3.3KV substations including civil and foundation work, erection and commissioning of required nos. of bays including GI structures, insulators and other accessories as per requirement.
- b) Proper roads are to be provided within the switchyard to facilitate the transporting of Equipment to their respective site.
- c) Soak pits are to be provided for all the Power transformers.
- d) Proper drainage system of the leakage transformer oil up to the soak pit should be provided.
- e) Baffle wall should be provided between two Power transformers.
- f) Full proof drainage system should be established to protect the Electrical Equipment from submerging.
- g) Switching yard should be covered with gravels as per requirement.
- h) The 33KV switchyard should be fenced and properly earthed. However, the total compound (including switchyard and control room) should be covered within the existing boundary wall.
- i) Cable tray & cable trench are to be constructed as per requirement.
- j) After preparation of substation drawings, approval should be taken from the competent authority.

2.5.1 During construction of the CHP, following points are to be taken care of

- a. Erection and commissioning of overhead line from 33KV substation to 3.3kV substations, DP/4 pole structures, power receiving & distribution centre as per requirement.
- b. Internal and external illumination arrangement of the entire CHP.
- c. Power Supply System for lighting and welding sockets.
- d. Control system for Centralized auto-remote and auto sequence interlock control manual control, etc. The control shall be implemented by PLC
- e. Communication and signaling system.

- f. Air Conditioning System for Engineer-in-charge room, central control room, PWWL control rooms etc.
- g. Proper ventilation for the Switchgear room of all the 3.3 KV substations
- h. Selection and provision of exhaust fans and ceiling fans in all the buildings wherever necessary.
- i. Preparation of installation drawing in accordance with approved design. Final approval shall be given by the Customer.
- j. All other Electrical/Civil/Mechanical works not mentioned here but required to be done as per system requirement for commissioning of the whole plant will be deemed to be included.
- k. The ratings shown in drawings are only indicative and for tendering purposes only. The Bidder however shall give detail drawings, ratings specifications of every item.

2.6 CIVIL AND STRUCTURAL WORKS

2.6.1 GENERAL

The scope of work under this contract shall include design, construction and successfully commissioning of all civil and structural works including supply of detailed survey drawing showing contour, geo-technical investigation, supply of geo-technical report, supply of detailed design, working drawings including all relevant calculations and all necessary works as may be needed for testing and commissioning, elimination of all teething trouble, performance test and handing over of the plant as envisaged in detailed scope of work and system description. The necessary construction, erection, commissioning equipment related to civil engineering works shall be provided and transported to the site of work by the Bidder. Due consideration shall be given for economy, architecture and functional utilities. This is a contract for complete installation including planning and design, supply, execution and erection of civil & structural work. Accordingly, all works needed for successful completion and operation of the plant shall be covered in the scope of work whether specifically mentioned here or not.

Adherence to Indian Standards

All the works including designs, drawings, construction, fabrication, testing, erection, etc. shall be done strictly as per relevant BIS Code of Practices, wherever no Indian Standard is available, British, American or other international standards may be used only as per its applicability and justification.

2.6.2 BASIC SCOPE

The scope of work covers all the related civil and structural works, detail designing of the same and successfully commissioning of the civil and structural works for handing over the plant. This shall inter alia, include the following:

Design & engineering of all civil and structural works of the plant.

Execution of all civil/structural works consisting of the following:

- a. Detailed survey of site including contour map preparation
- b. Preparation of construction site.
- c. Supply of structural steel for the work as required.
- d. Supply of all civil construction materials and other materials as required.
- e. Execution of all civil works.
- f. Fabrication and erection of structural steel work.
- g. All civil and structural works of connected equipment and accessories undersupply.
- h. Excavation/ construction/ erection/ installation and commissioning of all auxiliary services such as sanitary, drainage, roads, retaining walls, pavements, office and service buildings, lighting towers, landscaping/grading/leveling/fencing/site clearing as detailed elsewhere.
- i. Transportation of all construction materials to site, whether procured within the country or from other countries.
- j. Water supply arrangement for potable, industrial and firefighting purposes.
- k. Drainage and sewerage
- l. Firefighting arrangement.
- m. All the protective measures for proper drainage for safety of structures, against ingress of water / seepage due to seasonal nallahs and its tributaries which are flowing through the construction site area as per actual site conditions and requirement.
- n. All the protective measures for safety of men and materials during construction against rail/dumper movements on existing railway tracks/haul roads.
- o. Works required for erection and commissioning of all the plants and equipments.
- p. Inspection and testing.
- q. Performance guarantee.

Perception and remedial measures for the safety of entire CHP area under the scope keeping in view the adjoining natural and artificial features such as hill slopes, nallah, buildings, etc.

Any other works/services not mentioned but required for the completion and commissioning of the plant. .

2.6.3 DESIGN/ENGINEERING

2.6.3.1 DESIGN CRITERIA

All detailed design and working drawings will be developed with proper coordination and inter-relation with mechanical and electrical equipment. The design of RCC structure shall be carried out in general as per code of practice of plain and reinforced concrete for general buildings construction BIS 456-2000 and other relevant standards including up-to-date amendments. The steel structure shall be designed and fabricated as per Code of practice for use of structural steel in general

building construction BIS800 (latest edition) with up to date amendments and other relevant IS standards. The building/structure shall conform to local by-laws, rules and regulations for industrial buildings and as per relevant Indian Standards. Latest codes of practice with amendments up to date shall be strictly followed. In the absence of BIS codes, British standards Institution or the approved international bodies' codes could be considered for design as per its applicability and justification. The bidder shall be responsible for and shall pay for any alterations of the work due to any discrepancies, errors or omissions in the design and drawings or other particulars supplied by him, whether such design, drawings or other particulars have been approved by customer or not.

2.6.3.2 LOAD CONSIDERATION

Loads to be considered in design shall be as per relevant BIS codes of practices. Generally, in design the effect of dead loads, live loads, load due to impact, vibration, erection, wind load, seismic loads, dust load and load due to surcharge and moving vehicles, effect of blasting etc. wherever applicable shall be considered. The loads due to equipment shall be supplied by the bidders which shall be considered for designing of civil & structural. In general, live load, wind loads, etc shall be as per BIS-875 (latest edition). Seismic loads to be considered in design shall be as per BIS 1893 (latest edition). The maximum bulk density of coal will be taken as 1.2t/m³ for load design calculation in respect of coal retaining structures. However, this is to be verified through lab test and reports to be submitted by the bidder before approval of drawings. Effect due to blasting is to be considered while designing the structures, as per the provision of BIS: 6922 with latest revision. The topography factor for the calculation of design wind pressure shall be calculated as per BIS 875 read with the latest amendment.

2.6.3.3 ANALYSIS & DESIGN

All RCC and steel structure shall be designed in accordance with relevant IS Codes of practice of latest revision. In the analysis of structures, the worst loading combination of belt pulls, equipment loads, their impact, wind/seismic loads/blasting effect, coal and other loads as envisaged shall be considered.

2.6.3.4 DESIGN DRAWING & DETAILED ENGINEERING

Broadly all the dimensions as given in the tender document drawings are to be followed for bidding purpose. These dimensions are indicative & may require changes during detail design.

2.6.3.5 PREPARATION

All the drawings shall be prepared in accordance with the provision of latest Indian Standards. All drawings shall be sufficiently detailed and dimensioned to help in speedy construction, fabrication and erection of structures. Wherever, any structure is presented in more than one sheet of drawings, same scale and notations shall be used in all the sheets for linking the drawings with each other. All modifications made in structure during various stages of construction should be duly incorporated in working drawings. Bar bending schedule, detailed material list and specification of works shall be prepared / detailed. Working drawing shall also include general arrangement drawings showing plans at different levels with sectional elevations. Separate detailed drawing shall be prepared for inserts and anchor bolts including their fixing details. The design drawings associated with steel structure should show the force in the members, complete details of all members, joints, gusset plates, welding, riveting, bolting, etc. The drawings should also show the weight of each assembly/sub-assembly as far as possible. In addition to design drawings, fabrication drawings shall also to be prepared, showing item wise details, erection units, materials list, details of fasteners with assembly, etc.

2.6.3.6 SUBMISSION OF DESIGN/DRAWINGS

The tenderer shall submit Geo-technical report, all the relevant detail design calculations, general arrangement/detail drawings, bar bending schedule, detailed material lists, specification of works including contour plan for approval of SCCL / consultant on standard size sheet. Scrutiny and approval of drawings may be carried out through the consultant engaged by SCCL. All design details and drawings shall be submitted for approval of the following: • General Arrangement Drawings • Detail design calculations • All detail civil/structural/fabrication drawings • Any other drawings relevant for execution/fabrication of civil/structural works Bidder shall submit for approval six sets of drawings along with detailed design calculations including analysis of force/stress in the structure along with the source from where data, except BIS codes, have been taken. Photocopies of such data should be submitted along with the design. Along with the six sets of hard copies a soft copy in CD in autocad format shall also to be furnished.

2.6.3.7 PROCEDURE OF APPROVAL OF DRAWINGS

The SCCL shall have the final say in the approval of drawings. Drawings so submitted will become the property of the SCCL. The approval of the drawings does not absolve the Bidder from the overall responsibility of the plant for its successful operation. The Bidder shall be responsible for and shall pay for any alterations of the work due to any discrepancy, errors or omissions in the drawings or particulars supplied by him, whether SCCL has approved such drawings or other particulars. Approval by SCCL / Consultant Design & drawing, submitted by the Bidder, shall be scrutinized by SCCL. Out of six sets of drawing submitted to the Bidder

approval as the case may be. The Bidder shall carry out the necessary rectification in drawings after discussion with SCCL in a reasonable time as agreed upon mutually and resubmit six copies of such revised drawings for approval of SCCL. Revised drawings shall then be scrutinized and approved if the comments made by the SCCL are incorporated / taken care of. One copy of such drawing will be sent to the Bidder after approval.

2.7.3.8 AS BUILT DRAWINGS

Bidder shall make necessary correction / modification in the drawing as per actual work and shall prepare as built drawing. The Bidder shall supply such 8 (eight) sets of prints of as built drawing to the SCCL along with one set of reproducible drawings in AutoCAD format. The same will hold good for other documents also to be supplied by the Bidder under the heading of basic scope. All drawings should be prepared on AutoCAD in standard format and CD containing such drawing shall also be supplied along with hard prints.

2.7.4 DETAILED SCOPE OF WORK

A.COMPONENTS OF CHP – IN BRIEF

The civil and structural works are related mainly to the following areas (but not limited to):

- a. TRUCK RECEIPT HOPPERS COMPLEX - Truck Receipt Hoppers Complex with all provision of civil and structural work of 4nos. of 60t capacity
- b. 21000T(8000T+5000T+8000T) CAPACITY SEMI- GROUND BUNKER WITH WMM PAVEMENT This shall be designed and constructed as per system requirement
- c. RAPID LOADING COMPLEX - Loading complex with two nos. of PWWL Systems, each of 600/90 cu.mtr capacity, staircase, pavement for railway track etc. shall be designed and constructed as per system requirement
- d. CONVEYOR GALLERY FOR CONVEYOR (GROUND AND OVERHEAD)- This shall be designed and constructed as per system requirement
- e. TRIPPER CONVEYOR GALLERY- This shall be designed and constructed as per system requirement
- f. TRANSFER HOUSES, DRIVE HOUSES AND CRUSHER HOUSE are to be designed and constructed as per system requirement.
- g. 33 AND 3.3 KV SUBSTATION- The 33 AND 3.3 kV substation buildings for the proposed CHP shall be constructed. Construction of substation building and yard is in the scope of this work.

B. SERVICE BUILDINGS

- a. Service building such as main CHP office, rest room, First aid centre, canteen etc. with provision of separate room for each executive and supervisor
- b. One no. Store near main CHP office Plinth area
- c. One no. security post/ time office near main CHP office Plinth area
- d. Light vehicle parking shed for 6 Nos. of vehicles near main CHP office Plinth area
- e. Shed for 50 cycle Motors
- f. Common toilet Plinth area
- g. Five (5) Nos. of Electrical sub-stations(33KV and 3.3 KV)
- h. Workshop Building with Rooms

All buildings are to be designed by the bidder as per functional requirement

- a. Road - As required
- b. Pavement area - As required
- c. Boundary wall - As required

C.RETAINING WALL, DRAINS, CULVERTS, ETC – AS PER REQUIREMENT

- a. Drainage and sewerage including septic tank, soak pits, etc. –

As per requirement

- b. Water supply arrangement including receiving, storage and distribution of water for potable, fire fighting purposes, dust suppression purpose, etc. is covered in the scope of work. Separate sump shall be provided for potable water.
- c. Adequate capacity of Ground water reservoir shall be constructed
- d. For dust suppression & fire fighting reservoir
- e. For potable water - As per requirement
- f. PVC Tank shall be provided at all the required places for potable water.
- g. The tank/reservoir shall be covered with provision for regular inspection and cleaning.

D. OTHER WORKS AND REQUIREMENTS

- i) Development works such as grading/leveling/dressing of the site etc
- ii) Fencing/boundary walls with gates
- iii) Architectural requirement
- iv) Landscaping and Arboriculture
- v) Fire fighting
- vi) Dust suppression and extraction
- vii) Plant cleaning
- viii) Survey, Soil investigation and collection of rainfall and hydrological data
- ix) Construction, Fabrication, Erection and Commissioning of the plant
- x) Inspection and testing
- xi) Remedial measures for safety and successful operation of the plant
- xii) Other miscellaneous works/services/requirements etc. as may be necessary for successful commissioning of the plant.

2.7.4.2 SAMPLER HOUSE

One sampler house of steel structure shall be provided at suitable location on reclaim conveyors. The sampler house shall have sufficient space to accommodate cutter type sampler/primary sampler, primary sample feeder conveyor, crushers, secondary tertiary sampler, sample collector, bucket elevator (if required), necessary power supply, control etc. to make the Sampling system complete. There shall be provision of Electrical hoist as per requirement. Suitable approach to all equipment levels shall be provided. The side cladding and roof shall be of pre coated galvanized iron profile sheet. There shall be provision for ventilation and lighting.

2.7.4.3. RAILWAY TRACK NEAR WAGON LOADING SYSTEM

At ground level, railway track shall be provided below the PWWL system for loading through RLS for which a rigid pavement suitable for ballast less track as per norms of RITES, Indian Railways, shall be provided. Proper drainage system shall be provided around the wagon loading system to prevent stagnation of water during peak precipitation. Extent of pavement for railway track below the silo shall be as per manufacturer's recommendations but not less than 50m on either side of centre line of wagon loading system. However, laying of track is not in the scope of the bidder.

2.7.4.4 21000 T GROUND BUNKER (Elevated)

The bunker shall be semi-ground type with capacity to store 21,000 tonnes(8000T+5000T+8000T) of coal and shall be of RCC construction. The layout of the bunker shall be as per requirement. The bunker will be fed by 02 nos. of tripper conveyors for which necessary supporting arrangement for tripper conveyor should be provided. The reclaim tunnel inside the bunker should accommodate two conveyors with required spacing on both the sides. Weep holes shall be provided in the walls for exit of water. There should be provision for installation of conveyor belt and other accessories including feeders as per system requirement. Tripper conveyor gallery/gantry above semi-ground bunker shall be of structural steel. The roof and side cladding shall be of pre coated galvanized iron profile sheet. Walkway shall be provided with chequered plates. Hand railing shall be provided. The gallery should be supported on steel portals with RCC foundation. The side slope of the bunker shall be 55 degrees to horizontal. The inclined portion of bunker slab shall be provided with 25 mm thick abrasion resistant lining of ferrosite/ ironite. The roof of the bunker shall be covered with pre coated corrugated M.S sheets. Suitable wind ties shall be provided. Provision shall be made for R.C.C escape tunnel with suitable slope to have additional approach from the ground level to tail end of the conveyor inside the bunker tunnel. It should be of at least 3m in width and 2.4m in height. Steps of at least 1.2 m width shall be provided with suitable trade and rise. Balance width should be provided with suitable flooring. Necessary shutter shall be provided at the exit end of the escape tunnel as per requirement. All the facilities of

maintenance, hoist, monorails, etc. shall be provided as per system requirement. All the necessary inserts shall have to be provided for fixing cables, supporting structures for conveyors, etc. The shelves for plough feeders shall be extended upto a minimum distance of 5 m at both ends from vertical wall of the ground bunker for maintenance purpose. Bunker floors shall be of RCC. The floor shall be provided with suitable slope along and across the conveyor for proper drainage. Road shall be provided around the ground bunker as per system requirement.

MACHINERY WELL (MAINTENANCE BAY)

Provision have been made for two machinery wells of suitable size on the both the ends of the ground bunker. The floor of the wells shall be same as of the bunker floors. Roof and wall of the machinery well shall be designed and constructed as per system requirement. Arrangements should be made for providing 5T capacity Electric hoists . Monorail facilities should also be provided so that equipment can be lifted/ repaired and loaded in trucks. Stairs of minimum 1.2 meter width shall be provided in both the wells. Necessary doors with shutters and windows shall be provided as per requirement.

2.7.4.5 TRUCK RECEIVING HOPPERS

Truck receiving hoppers (over ground type) of RCC construction shall be provided. It shall consist of four numbers of truck unloading facility in series are to be provided. The total capacity of the hoppers shall be $4 \times 60T = 240T$. The hopper should be of RCC having walls of suitable slope to facilitate smooth flow of coal to the openings. Ironite/ ferrosite liners are to be provided suitably. There shall be no unevenness in the slope of the hopper. A platform of suitable area (minimum 30 m)all around the hopper for plying the huge number of trucks/ dumpers at the loading platform and ramp of suitable gradient shall be provided. The ramp for approach up to truck receiving platform should not be steeper than 1 in 16. The surface of the platform shall be suitable to sustain the movement of trucks/ dumpers. Proper care is to be taken to protect the pavement area and ramp from soil erosion and settlement as it is on filled up soil. The hoppers will be covered by a shed to prevent entry of rain water. A steel fabricated maintenance platform is to be provided for the Reciprocating feeders placed underneath the outlet pockets.

2.7.4.6 CONVEYOR GANTRY/GALLERY FOR SINGLE/DOUBLE (GROUND AND OVERHEAD)

- A. CONVEYOR GALLERIES The details of single/double conveyors gallery as shown in the different drawings are under the scope of this contract including installation of conveyors. The supporting arrangement of the galleries is to be designed such that any part of the structure is not affected by water even during highest water accumulation. Final leveling, dressing and compaction of

the filled up ground, if any, along the alignment of conveyor, is also included in the scope of this work. Before start of actual construction over earth/ OB filling, (If any) assessment of soil condition and all steps for its improvement as per design requirement are included in the scope of this work. The foundations shall be designed in such a way that there is no appreciable settlement in due course of time. Rectification of any subsequent settlement during entire contract period is covered under the scope of this work. Proper drainage arrangement for storm water all along the conveyor alignment, considering the adjoining catchment area shall be provided. No intermediate support shall be provided inside the conveyor gallery. The bidder may visit the site to have first-hand information about ground profile and other necessary details before bidding.

- B. **GROUND CONVEYORS** The conveyor shall be housed in a suitable enclosed gallery of structural steel with walkway as per drawing. The roof covering shall be of pre coated galvanized/corrugated iron profile sheet. At least 50% of the side area shall be covered by brick masonry. 12% of the roofing area and 8% of the side cladding area shall be covered with translucent sheets. As part of the conveyor will be on the ground, some amount of cutting of different type of soil and rock may be required for laying out the conveyor system. The foundation top of the conveyor posts shall be placed at a height of minimum 150mm from the ground level and at a maximum interval of 3.0 m. The floor of the gallery shall be extended at least 1.2M all around beyond the gallery. Proper drainage arrangement for storm water all along the conveyor alignment, shall be provided. The floor of ground conveyor shall be of concrete with flooring on top.

Cross over in conveyor gallery shall be provided as required. In general cross over will be at interval of 100 m. However, this interval may be less or more at some places depending upon the location of the structures and machinery etc.

C. **OVERHEAD CONVEYORS**

Overhead conveyor shall be housed in a suitable enclosed gallery of structural steel having minimum of 1.0 metre walkway/cat way for each conveyor with chequered plate flooring. Steel trestle with RCC foundation shall be provided for supporting gallery. For double conveyor gallery 1.0m walkway / cat way is required where as for single conveyor gallery 1.0 m walkway is to be provided at one side and minimum of 600mm on other side. Walkway shall be kept normally at a distance of 1000mm from belt top; however variation at kink shall be min of 800mm to max of 1250mm. Trestles are to be provided at every kink point. Cable tray and other utilities are to be accommodated within the gantry space. Hand railing shall also be provided. Structural steel trestle with RCC foundation shall be provided to support gallery. The height of trestles may vary. Trestles shall be provided with due consideration to stability and permissible vibration. The trestles of the conveyors shall be so designed that the RCC portions of pedestal are 1.5m above the ground. The spacing of

trestle for overhead conveyor gallery shall be suitably spaced. Adequate clearance and safety arrangement should be provided for trestles nearby railway line, roads and other infrastructures. Additional guide plate shall be provided to protect the trestle from any damage if required

2.7.4.7 TRANSFER HOUSE, DRIVE HOUSE

The drive house and transfer house shall be of structural steel construction and shall be provided with monorails, with hoist block / chain pulley block for material handling purposes. The drive arrangement should be kept near to the Transfer House as far as possible. Drive houses and take up arrangement of suitable size are included in the scope of the Contract. The roof covering and side sheeting of the structure shall be provided with pre coated galvanized/corrugated iron profile sheet. 12% of roof and 8% of side cladding area shall be provided with translucent sheets..Dusts down comers are to be provided in all floors. Openings for electric cable entry are to be provided on all the floors suitably. Different floors of the transfer houses shall be made with minimum 6 mm thick chequered plate. The ground floor of the transfer house and drive house shall be at least 450 mm above the final accepted ground level and shall have concrete floor with ironite flooring on top. This floor shall be extended 1.5M all around beyond the transfer house. All the intermediate floors shall be of structural steel.

2.7.4.8 SUB-STATION BUILDINGS

One number 33KV and four numbers 3.3KV sub-station namely 1,2,3, and 4 shall be of RCC framed structure, plastered and finished with acrylic based smooth exterior paint from outside. Inside painting shall be done with plastic emulsion paint. The location of substations has been shown in the system drawing. The substation 1,2,&3 will be a single storey building whereas the substation 4 which also have a control room for the plant shall be a double storied building. Each 3.3kV substations shall have the minimum plinth area of 450 sq.m. which may change during detail engineering as per equipment requirement. Necessary clearance shall be provided along all the equipment installed in the substations as per the norms. The Substations will have transformer rooms, MCC rooms, tool room, capacitor bank room, control room, etc. The floor of the building will be vitrified or other type, depending upon specific functional/safety requirement. The layout of the cable trench/ cable vault will be as per system requirement. The invert level of the cable trench shall be kept minimum 0.5 m above finished ground levels and the plinth of the building shall be fixed accordingly. The building shall be provided with RCC roof. There will be suitable arrangement for lifting the transformer in case of breakdown/maintenance for which suitable RCC platform shall be constructed at same level outside the substation building to facilitate handling of the transformer and other equipment. The scope covers construction of complete building with cable trench and foundation of the equipment in all respect..

The 33/3.3 kV substation for the proposed CHP shall be constructed near to the CHP. Construction of substation building and yard for CHP is in the scope of this work.

2.7.4.9 SERVICE BUILDINGS

All the buildings except otherwise mentioned below shall be of RCC framed structure, plastered and finished with acrylic based smooth exterior paint from outside. Inside painting shall be done with plastic emulsion paint. However, lighting towers, light vehicle parking, scooter / bi-cycle sheds may be of structural steel. The area for the various service buildings to be provided has been given earlier. Plinth level of service buildings shall be sufficient around the buildings. Flush doors, rolling shutters, collapsible gates and steel grill, aluminium windows etc. are to be fitted as per requirement. All the buildings shall be given pre-construction anti-termite treatment. The floor shall be of vitrified type/ any other type depending on specific functional requirement. The store floors shall be of RCC with ironite topping. The floor of the battery room shall be anti-acidic. The battery room should be provided with exhaust fan to exhaust the fumes.

- a. **CHP OFFICE** The main office shall be situated near the 33 KV substation as located in the plan. Besides Officers' room, the CHP Office shall include a rest room, a first aid facility and a canteen. The CHP Office shall be a single storied building and have cycle / scooter shed and car parking shed for the required operational/maintenance manpower of the CHP. A separate store shall also be provided adjacent to the office campus.
- b. **SECURITY POST/TIME OFFICE** One Security Post with time office of suitable size with appropriate verandah opening shall be provided near the main office. Security Post is to be designed from functional and aesthetic point of view.
- c. **TOILET** In addition to the toilets in service buildings, one common toilet shall be provided as per requirement. The facilities shall include water closet, urinals, washbasin, looking mirror, cistern, towel rail, glass shelf, flush doors etc. The floor and wall of toilet should be tiled with ceramic tiles. Anti skid floor tile shall be provided.

2.7.4.10 SERVICES • INDUSTRIAL WATER/DUST SUPPRESION/FIRE FIGHTING WATER

Filter bed of adequate capacity shall be provided for firefighting and dust suppression purpose. The capacity of the reservoir shall be fixed after calculation of water requirement on the basis of relevant norms/system requirements. Ground water reservoir shall be covered, with provision of necessary ladders, wash out etc. Separate water pipe line and arrangements shall be provided for fire fighting and

dust suppression purpose. Pumping facilities shall be provided with 100% standby arrangement.

All pipe lines and pumping arrangement including construction of pump house and filter beds in the scope of this work.

A. DRINKING WATER

Individual PVC overhead tanks of required capacity but not less than 1.0 m³ capacity shall be provided over each sub stations/control room, offices, and other service buildings as per requirement. Necessary receiving and distribution piping and pumping arrangement is covered in the scope of the work. Adequate drinking points with PVC tank, shall be provided at all drive houses, transfer points, truck receipt hoppers complex, bunker, wagon loading systems etc. The distribution system for drinking water shall be done as per requirement. The facility for drinking water shall also be provided at suitable points in offices, service buildings, toilets, etc. with all necessary fittings and fixtures. A separate portable water reservoir of suitable capacity shall be constructed nearby the main ground water reservoir.

B. DRAINAGE ARRANGEMENT

Proper surface drainage facilities of adequate dimensions, specifications and slope shall be provided for the entire CHP to take care of all the storm water which is likely to be encountered considering the topography and the natural drainage of the construction sites and the adjoining area. Dimensions and specification of drains and culvert/cross drainage works shall be so engineered and constructed so as to receive and discharge all the storm water entering into the proposed plant area including run off from the area outside the proposed construction site which is likely to enter the proposed plant area. The storm water shall be disposed off to the nearest nallah or shall be taken to a suitable distance beyond the boundary of CHP, where it can be properly disposed. Drain shall be provided with pre-cast RCC covers, wherever necessary. All the drains shall be constructed with brick masonry.

C. SEWERAGE

Proper sewerage shall be provided for handling of sewage. This will include provision of septic tank, soak pit, sewer line, man hole, inspection chamber and all other fittings and fixtures needed for the same.

Industrial effluent from the entire CHP shall be disposed off beyond the boundary of CHP. However, construction of ETP is not in the scope of the work.

2.7.4.11 ROADS

Whole of the proposed CHP area shall be well connected with CC roads for movement of men and materials. These roads shall be well connected with the existing road network. These roads shall have 7.50 m wide carriage way with minimum 1.5 m wide shoulders and drains of suitable size and specification on both sides of the road. The road shall be designed for movement of LMVs like cars, jeeps, trucks, rubber tyres mounted mobile cranes etc., considering the prevailing soil conditions. Suitable culverts, if required for free flow of surface drainage shall be properly designed and provided. The ground bunker, drive houses, all service buildings, water reservoirs, pump houses, offices, switching stations etc. shall be well connected with PCC road.

WMM PAVEMENT AROUND TRUCK RECEIVING HOPPER COMPLEX AND TRUCK UNLOADING AREA.

WMM pavement shall be provided to sustain the movement of loaded tippers of capacities not less than 25/30Te. Proper slope in the pavement should be provided to avoid accumulation of water during rain. Ramp of suitable gradient shall be provided to connect the approach road. At any point, the slope of the ramp should not be steeper than 1 in 20. Proper arrangement like retaining wall, pitching etc, shall be provided to protect the pavement area and ramp from soil erosion and settlement, as it is on filled up soil.

2.7.4.12 OTHER WORKS/REQUIREMENTS

A. SURVEY, SOIL INVESTIGATION AND COLLECTION OF RAINFALL AND HYDROLOGICAL DATA

No data regarding the above are made available in this tender document. The bidder is required to inspect and examine the site and its surroundings and satisfy himself as to the nature of ground, rainfall and the soil, the availability and suitability of other requirements, as required for fair bidding purposes. The successful bidder shall have to undertake detailed survey, detailed soil investigation and collection of hydrological data, rainfall data, prepare and submit a comprehensive soil report with recommendations for type of foundation, bearing capacities, method of deep excavation, probable settlement for foundations etc. for approval of the SCCL/consultant. Reports approved by the SCCL/consultant shall be finally adopted for design and engineering. Soil investigation should be done in the presence of the SCCL/consultant. No extra claim shall be made over contract price for variation in soil, rainfall and hydrological investigation reports which may result in change of design and type of foundation. All works related to site survey shall be conducted as per standard practice and also as per system requirement.

B. EARTHWORK IN EXCAVATION

Excavation of earth for all types of soil for construction of all the civil structures is covered in the scope of this contract. Final grading/ levelling and dressing of ground in and around the proposed CHP area is under the scope of this contract as per technical and functional requirement. Excavation for proper drainage of rain/ subsoil water around the truck receipt hoppers complex, ground conveyor, service buildings, transfer houses, drive houses, switching stations etc. is covered under the scope of this tender. The depth and size of the excavation will be as per approved system requirement and as per detail design drawings. All cuttings and fillings as per required level and profile including transportation/ disposal of soil is included in the scope of this work.

Bidder shall ensure proper consolidation and stability of the pavement area and its embankment suitable for plying loaded tippers. Toe wall, dwarf wall or retaining wall, as required, to protect the embankment shall be provided by the bidder. Side slopes will have boulder pitching with suitable drainage channel. The HFL, Bed level, water flow, etc. of the existing water courses, sub-soil water table shall be taken into consideration while designing the structures. Bidder shall undertake various remedial measures for protection of the proposed CHP area from streams/water courses as per requirement.

C. LANDSCAPING AND ARBORICULTURE

The proposed CHP complex shall be designed keeping in view its proper aesthetic appearance. The perspective view of the CHP with landscaping shall be submitted. To provide better environment and arrest dust around CHP, plantation of approved variety, should be done to form impervious hedges around the plants and shall be maintained by bidder for the period of one year after plantation.

D. BOUNDARY WALL

The proposed CHP complex, as shown in the drawing, should be provided with boundary wall having of 2.0m high brick wall above formation level with concertina coil type fencing on top of the wall. Layout of boundary wall indicated in the drawing is tentative and may change as per actual site conditions and functional requirement. The final layout of boundary wall shall be decided during detail engineering. Boundary wall shall be properly painted. Gate should be provided in the boundary wall with main and pedestrian gate as per functional requirements.

E. FIREFIGHTING

Whole of the CHP shall be protected against fire. Automatic fire fighting facilities shall be provided as per relevant IS codes and TAC norms. Hydrants/spray nozzle

shall be provided at suitable intervals all along the proposed CHP as per technical requirement. Water tanks and pump house is included in the scope of work. The capacity of the water tanks shall be fixed as per relevant norms but shall not be less than those as mentioned earlier.

Fire fighting points/hydrants shall be provided for entire proposed CHP including truck receiving hopper complex, transfer points, drives houses, conveyor, galleries, ground bunker, silo, switching stations and service buildings etc. Fire hydrants shall be provided at an interval of 30m in the entire plant. Necessary landing valves at all the floor of silo, switching stations and at other places wherever necessary shall be provided.

The pressure of each hydrant shall be not less than 3.5 kg/cm² when up to four hydrants are used simultaneously.

F. DUST SUPPRESSION AND EXTRACTION

Proper water supply arrangement for dust suppression and dust extraction will be made at dust generating points so that all working space remain free of dust. For dust suppression, water jets will have to be provided in truck receiving hopper area, transfer points, silo and other places as per requirement. For proper ventilation in all the working floors, arrangements for installing exhaust fans/ventilation fans with ducting will have to be made as detailed elsewhere in the tender document.

All civil works pertaining to dust suppression and extraction shall be as per system requirement. The pumping sets for the dust suppression/control shall be provided with 100% standby arrangement at each location.

G. PLANT CLEANING

Water and compressed air pipe line network along with connection/tapping points with control valves at suitable intervals shall be provided in the truck receiving hopper floors, transfer and drive houses, conveyor galleries, switching-stations, bunker, silo etc. for pressure cleaning of floor chutes, walkways etc. Proper drainage arrangement will have to be made all along the plant so that water or slush accumulation is avoided. At every probable spillage point suitable arrangement will have to be made for a mechanized or manual cleaning.

2.7.4.13 CONSTRUCTION, FABRICATION, ERECTION AND COMMISSIONING, OVERHEADS AND SUPERVISION

A. CLEARANCE OF SITE BEFORE START OF WORK

Site shall be handed over to the Bidder in 'as it is' condition. Any site preparation work including cleaning, cutting, filling, levelling, grading, removal, etc. before start of

the actual work shall be done by the Bidder to the full satisfaction of Engineer-in-charge.

The Bidder has to do their own arrangement for construction water at site. One point for drinking water only, will be provided within 100meterof the work site for which necessary temporary storage arrangement may be made by the Bidder.

B. SITE CLEARANCE AFTER COMPLETION OF WORK

After the completion of work, the Bidder shall remove scaffolding, sheds rubbish and surplus materials except which are required for rectification of defects. Bidder shall hand over the site in clean and tidy condition after cleaning the total area including floor, drains etc. fit for the use by the SCCL.

C. LAYOUT AND LEVELS

The layout and levels of all structures, etc. shall be done by the Bidder at his own cost from the general grid of the plot and bench marks given by the Engineer-in-charge for checking the detailed layout and correctness of the layout and levels. But the Bidder shall be solely responsible for correctness of layout and levels.

D. SPECIFICATIONS

The specifications should be intended for general description of the work, quality and workmanship. The work shall be executed according to the relevant Indian Standard codes of practices or to the recommendations of relevant American and British Standard in cases where Indian Standard codes are not available for such works.

As such the Bidder should plan the work and items in detail. Generally, steps required towards the standardization to nearest higher rating of equipment keeping in view of energy conservation, safety of men and materials, better environment, shall be considered at any stage before or during execution with due prior approval with no extra cost to MCL.

E. CONSTRUCTION METHOD AND EQUIPMENT

The Bidder shall submit drawings and write ups indicating a broad outline of how he intends to execute the work.

F. INSTALLATION/ERECTION AND SUPERVISION

It shall be the Bidder's responsibility to bring, receive and keep the materials in safe custody in proper condition. Responsibility of handling the materials during manufacturing, transit and handling at site rests with the Bidder. All the equipment will have to be installed and fitted with accessories as per approved drawing. Entire tools and tackles, manpower and any other material required for successful installation will be supplied by the Bidder. The Bidder shall furnish the list of engineers, supervisors and other skilled personnel to carry out the job properly.

G. COMMISSIONING

After installation, including electrical civil/structural items, the individual equipment will be commissioned and put on no load trial run. Any defect noticed will have to be rectified/replaced at Bidder's cost. After commissioning all the equipment in the circuit individually on no load and having satisfied the consultant/customer, the entire circuit shall have to be put on load test and performance of individual equipment or its accessories or the circuit as a whole, will be observed closely by a joint team of engineers, customer's side and Bidder's side. This test run on load will continue till the representatives of consultant or customer is fully satisfied with the performance. The entire arrangement of the trial run shall have to be made by the Bidder at his own cost. The Bidder has to give intimation in advance in this regard to the consultant/customers, so that run of mine coal can be supplied to plant for load test. Any excuse on the part of the Bidder will not relieve him from the responsibilities of successful commissioning of plant to the best satisfaction of SCCL. To carry out the job of commissioning in the best possible way, the Bidder shall have to co-ordinate with all concerned agencies such as designer, equipment manufacturers, consultant, customer, statutory bodies and other government or local bodies as per requirement.

H. INSPECTION AND TESTING

All the tests required for materials, quality of work and any other tests as required/desired by the Engineer-in-charge shall be at Bidder's cost. The frequency and mode of testing shall be as per latest relevant IS Standards.

2.7.4.14 GENERAL REQUIREMENTS

- a. Any other requirement related to construction and operation, whether specifically indicated or not, but found necessary to be incorporated at a later date for safe and efficient operation of the plant shall also be deemed to have been covered within the scope of work of this tender.
- b. Wherever required, dewatering shall be done by the Bidder to avoid damage of equipment, structural, etc. and timely completion of work. This shall be carried out by Bidder without any increase in the cost.
- c. If any certification or approvals are to be taken from electrical inspector/statutory bodies, DGMS, the same shall be the responsibility of the Bidder.
- d. As per system requirement envisaged in the NIT documents, various parameters, specifications may undergo changes during detail engineering stage. This shall be carried out by the Bidder without any increase in cost.
- e. All safety regulations, labour laws, code of practices for power supply, manufacturer, installation, erection, commissioning etc. envisaged by the State Govt./Central Govt. or any authorities/bodies shall be strictly complied without any increase in cost.
- f. All Mines Acts and regulations will be followed during construction stage.